DOCUMENT RESUME

ED 438 635 EC 307 657

AUTHOR Haensly, Patricia A.
TITLE Museums, Adventures, Discovery Activities: Gifted Curriculum Intrinsically Differentiated.
PUB DATE 1999-08-04
NOTE 28p.; Paper presented at the World Council for Gifted and Talented Children (13th, Istanbul, Turkey, August 2-6, 1999).
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Community Resources; *Curriculum Design; *Discovery Learning; Elementary Secondary Education; *Gifted; Inclusive Schools; Learning Strategies; *Museums
IDENTIFIERS *Differentiated Curriculum (Gifted)

ABSTRACT

This paper discusses how museums, adventure programs, and discovery activities can become an intrinsically differentiated gifted curriculum for gifted learners. Museums and adventure programs are a forum for meaningful learning activities. The contextual characteristics of effectively designed settings for learning activities can, if the activities are constructed appropriately, become the right match or fit for any learner at any level of prior knowledge, any level of ability, and any predominance of participatory model. The last section of the paper describes a variety of examples of learning in museum settings, including the Smithsonian Early Enrichment Center and the Whatcom County Children's Museum, and a discovery learning curriculum on the history of civilization for third-graders. Adventure programs for adolescent learners are also highlighted, and include the Galveston Island Adventure, Camp Planet Earth, and the Lummi Summer Science Program. (Contains 55 references.) (CR)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 438 635

MUSEUMS, ADVENTURES, DISCOVERY ACTIVITIES: GIFTED CURRICULUM INTRINSICALLY DIFFERENTIATED

Patricia A. Haensly, Ph.D.
Department of Psychology, Western Washington University
Presented August 4, 1999 at the 13th World Conference of the
World Council for Gifted and Talented Children, Istanbul, Turkey

Abstract: Children's museums, adventure programs, and discovery activities proliferate because they are able to engage individual interests, promoting zest for learning outside of traditional school settings. When adventure and discovery are available, children take charge of their own learning, using play to generate rich insights about both contents and processes. To circumvent superficial interactions in child-chosen activities, scaffolding from wise experts-- teachers, parents or expert peers--is essential. Prompts, cues, suggestions rather than didactic directions allow children to retain ownership of direction and learning pace. They can select passionately fascinating content, process at individually appropriate intellectual levels, and extend process and outcome as ability levels permit. This presentation will include findings about children and parents in museum contexts; describe multiple contexts in which such participatory approaches can be implemented; demonstrate nature and necessity of appropriate scaffolding from wise guides; and generate extensions for applicability of this model of differentiatable curriculum for gifted children.

A. A Forum for Meaningful Learning

1. Functions served by museums, adventures
2. Stakeholders
3. Nature of interactions with content

B. Relationship to differentiated curriculum

1. Differentiated curriculum defined
2. As an agenda of choices

C. Contextual Characteristics of Museums and Adventure Programs

1. Internal consistency and reliability
   a. Essential criteria
   b. Critical attributes
2. Scaffolding and guidance
   a. Nature of scaffolding/ Rogoff's apprenticeship in thinking
   b. Vygotsky's zone of proximal development
3. Adult/ child and expert/ novice relationships

D. Extensions and applications of this model

1. Smithsonian Early Enrichment Center
2. Whatcom County Children's Museum
3. Mr. Rick's third grade history of civilization

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
Haensly
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Ec 307657

BEST COPY AVAILABLE

4. Adventures for adolescent learners
   a. Galveston Island Adventure
   b. Camp Planet Earth
   c. Lummi Summer Science Program

*****In summary:**
In Howard Gardner's words, museums create environments which enable students to "naturally link their intuitive ways of knowing with scholastic and disciplinary forms of knowing", building the capacity of learners to "take risks for understanding" (1991, p.258). Stephanie Pace Marshall, the founding director of the Illinois Mathematics and Science Academy, suggests that the reason why museums and apprenticeships are so powerful for learning is because "they facilitate learning that is both authentic and explicit. . . schools as museums, teachers as master craftsmen, and students as apprentice investigators--these are the educational environmental constructs in the high-stakes learning environment that we must create for our gifted students." (1994, p.192).

References

Csikszentmihalyi, M. (1991). Flow: The psychology of optimal experience. New York: Harper Perennial.

Gardner, H. (1991). The unschooled mind: How children think and how schools should teach. New York: Basic Books.

Greene, W.P., Magarity, D., & Toth, R. (1998). Museums & learning. A guide for family visits. Washington, D.C. : U.S. Department of Education, Office of Educational Research and Improvement. Also at http://www.ed.gov

Haensly, Patricia A. (November 14, 1998). Museums, adventures, discovery activities: Meaningful processing or surfing? Paper presented and audiotaped at the 45th Annual Convention of the National Association for Gifted Children, Louisville, KY

Haensly, P.A., & Parsons, J.L. (1993). Creative, intellectual, and psychosocial development through mentorship: Relationships and stages. Youth and Society, 25 (2), 202-221.

Hertzog, N.B. (1998). Open-ended activities: Differentiation through learner responses. Gifted Child Quarterly, 42 (4), 212-227.

Heyman, Michael. (November, 1988). Engaging a child's mind. Smithsonian, 29 (8), 12.

Kittelson, S. (1997). Whatcom Children's Museum. Major inquiry project report on children's cognitive development through participation in children's museums. Unpublished manuscript. Psychology special topics: Advanced cognitive development. Department of Psychology, Western Washington University, Bellingham Wa.

Marshall, S.P. (1994). Our gifted children: Are they asking too much?" Gifted Child Quarterly, 38 (4), 187-192. (Keynote address, National Association for Gifted Children, November 6, 1993.)

Rogoff, Barbara. (1990). Apprenticeship in thinking. Cognitive development in social context. New York: Oxford Press.

16577

SCOPE OF INTEREST NOTICE

The ERIC Facility has assigned this document for processing to:

In our judgment, this document is also of interest to the Clearinghouses noted to the right. Indexing should reflect their special points of view.

EC PS

Museums, Adventures, Discovery Activities: Gifted Curriculum Intrinsically Differentiated

Patricia A. Haensly, Ph.D.
Department of Psychology, Western Washington University
Presented August 4, 1999 at the 13th World Conference of the
World Council for Gifted and Talented Children, Istanbul, Turkey

A Forum for Meaningful Learning

A terrarium stood on the shelf at one side of the preschool classroom. In it was a tarantula spider brought by one of the teachers to add dimension to the study of insects and other small life that the children were engaged in learning about that month. Three and a half year old AL found a stool and sat entranced peering into the terrarium to observe the tarantula, though the other children were all engaged in other activities around the room. He heard the cheeping sound of the cricket that the teacher had just added to the tarantula's temporary home and was fascinated by what the spider would do with it. After all, they had been talking about what insects eat and do, had been tending carefully to their silk worm caterpillars waiting for the moths that would eventually emerge from the pupa cases, and here was a different type of insect doing different kinds of things.

AL was interested in the cricket's demise, not in a morbid way but as part of the food chain they had talked about in circle one day. He asked, however, about exactly why the spider needed to interact with the cricket in that way. AL remained entranced for at least 20 minutes minutely observing everything about these two creatures, even bringing over a magnifying glass thinking he might be able to see the two better. He also wanted to see more about the leg structures of these two creatures because the teacher had told and shown them in circle that insects have three parts to their bodies and he wanted to make some comparisons here. He spontaneously inferred that he might be able to check out this bit of information with his magnifying glass. Al continued to make the tarantula's activities his special area of concern for many days after, using them in his artwork and his story telling, talking with his parents about it, and making other leaps of fact and imagination and interdisciplinary connections to other topics discussed in the classroom. (Haensly & Lee, 1995; 2000)

Museums, adventures, and discovery activities can become a gifted curriculum for gifted learners, a curriculum that is intrinsically differentiated in that if the activities are constructed appropriately and viewed in all their possibilities, they can become the right match or fit for any learner at any level of prior knowledge, any level of ability, and any predominance of participatory mode. This article is designed to demonstrate how that case may exist, delineate the necessary conditions for this outcome to occur, point out the relationship to differentiated curriculum existing in this context, and describe appropriate examples in various settings that can be duplicated or preferably extended and adapted to the children and setting in which you work and teach. The

content will be organized to describe museums and adventures as a forum for meaningful learning, elaborate on the contextual characteristics of effectively designed settings, delineate the relationship of learning in this setting to intrinsically differentiated curriculum for learners including the highly able, and then describe a variety of examples of such settings.

Functions served by this forum

Emotional enjoyment and interest, participation and intellectual development, creative stimulation and idea generation, stimulus for ideas for other projects, interdisciplinary connecting, and learning for a lifetime, among other functions, were all taking place for Al in this small encounter as adventure and discovery became a reality for Al in a Minds Alive* classroom. Obviously, AL's behavior displayed his enjoyment and interest. The material invited his participation as he intellectually tried to consider the nature of the activities he was observing and their relationship to other information he had been gathering in the children's thematic lesson on insect life. As he observed the tarantula Al began to derive some of the short poems that he often created and eventually arrived at images which he incorporated in his art work. What he observed and thought about led to other creative projects such as using the magnifying glass to study the anatomical structure of the tarantula's legs and then comparing this information to that about the ants the children had been studying, as well as relating to stories in which such creatures played a role. These important interdisciplinary connections become the foundation for a lifetime of learning in which AL might eventually take a multitude of directions, guided by experts but initiated by AL himself.

These are among the many reasons why dynamically structured museums, adventures, and discovery activities, whether in a formal museum setting, or in a museum-like exhibit in a classroom, a home, or in the out of doors environment, capture children's attention so well. When comparable content is encountered through didactic instruction, in predigested forms such as worksheets or even preplanned, teacher-directed projects, the way many lessons are delivered and prescribed by adults in much of traditional schooling, learning proceeds according to the adults' sense of sequence and relevance rather than the child's. Learning in this latter mode often becomes an act of filling the vessel of the child's mind, as in the behavioral sense of intellectual development. However, in appropriately constructed museum exhibits, adventures and discovery activities, planning is based on engaging the child's attention in ways that ensure individually constructed responses to and connections with the content, with experts merely suggesting leads to productive thinking. Learning thus becomes a constructive process as in the cognitive developmental sense portrayed so well in Piagetian and Vygotskian theory.

Stakeholders

The concept of "stakeholders" is a particularly astute one to describe who the people are who might have a specific investment in well constructed children's museums, adventure, and

exploration experiences. The term stakeholders has come to mean (a) those who have some important benefit to gain from participating in a venture and therefore want to see it continued, (b) all those who play some kind of role in the interactions that take place, and (c) those who are instrumental in guiding the venture or have direct effect on policy involving the venture or institution. Thus, when we apply this concept, we realize that we must plan more specifically to keep the primary stakeholders, that is, the users who will benefit, in the forefront of our planning, rather than let the administrators or building maintenance people, or even those who will be become the guides and facilitators drive the planning. In the case of children's museums and adventure plans, if the children aren't "hooked" they won't invest their interest, and if the children aren't allowed to interact through their preferred modes of learning, the museum and adventure will have served little purpose for them other than as a distraction. The necessity for such prioritized planning becomes quite evident in the examples we will provide for you in a later section.

Children become stakeholders in so far as the venture captures their attention and requisite commitment to generate continued involvement. Parents and other educators become stakeholders as they set the stage for children's involvement, as they construct the exhibits and materials for participatory learning, and then as they gently guide the process without usurping the process to their own interests of what comes first, second, and next. The guiding process that they use must then prompt, cue, suggest, without predetermining the answers or even the direction of exploration, that is, guides must model their own construction of knowledge while participating as concurrent learners with the children in their knowledge construction. If the guides and facilitators already know all the answers, then the discovery and construction simply become adult-initiated guessing games. We will talk more about this process later as we discuss the nature of such scaffolding. Administrators also fall into a category of stakeholders as they allow classroom teachers to teach in this way, but they may also fall into the third category of stakeholder in the way they set policy regarding the ventures or the institution where the ventures will take place or their promotion. You will see clear evidence of this major force in some of the examples we provide in the last section of this article where we describe extensions of the museum and adventure model.

Thus, we might consider that the stakeholders of this type of venture are children first of all. Secondly, the parents and other educators, and museum or adventure designers and implementers become stakeholders. And, thirdly, those administrators and policy makers who foresee and provide the resources, both material and temporal, to support a wide variety of possibilities to make possible this type of setting for constructivist learning become stakeholders.

The Nature of Interactions in This Forum

Meaningful processing. First of all, for authentic learning and growth to take place in the museum and adventure forum, children's interactions with the content must be so richly envisioned and implemented that the activities consistently ***generate meaningful processing***

for a variety of different individuals, individuals characterized by many different prior experiences, knowledge, and ability levels. Constructivism in knowledge acquisition reminds us that exhibits or adventure plans must be designed to have multiple points of entry by different children, so that many individual children can find the exhibit "connect-able" to their own prior experiences, that is, within their own zones of proximal development (Vygotsky, 1978). Bettelheim also talks about the curiosity that a museum with well-planned exhibits can stimulate in children (Bettelheim, 1981), the developmental characteristic that promotes intelligent responses from even the youngest infant in any setting. More specifically, such productive exhibits and adventure plans will include an unspoken invitation by the content itself to the museum observer to enter into the content because it is personally intriguing right at this moment and within that individuals' ability to understand at some level. They will be designed so that users or participants become physically connected with them because they seem to have something to do with an extension of one's self, and because at very first glance the materials will invite ownership and agency--personal decisions to play with the material, rather than just respond to someone else's direction to merely solve someone else's stated problem.

Play and growth. In Bloom's examination of how talent develops (1985), we see that ***play and growth*** became synonymous in the life histories of the talented youth he studied. His research found that youth who experience strong feelings about some content or skill are more likely to become fully engaged in interacting with the content. In the early home life of the youth he studied who became immensely and productively talented by the time they were young adults, parents had encouraged their curiosity at an early age and answered their questions with great care, often deferring to the child's opportunity to discover an answer. When parents did not know the answers they modeled experimental interaction with the material and other ways of finding out the answers, frequently through reading or through seeking out experts who might know about the topic. Furthermore, "strong interest and emotional commitment to a particular field" followed by a "desire to reach a high level of attainment in the talent field" were among the general qualities in all the talent fields that Bloom studied, from music and the arts to athletics to math and science. Commitment was demonstrated by willingness to exert great effort and much time in order to achieve highly. What began in the child's mind as play and recreation with the activity led to dedicated work and activity in order to become so highly competent that the activity became their lifelong avocation or career.

Commitment to response and follow through. The concept of ***zeal***, proposed by Galton in 1869 as an integral part of giftedness, resurrected by Renzulli (1978) as ***task commitment***, found a new relevancy in the concept of ***"flow"*** as espoused by Csikszentmihalyi (1975, 1991). "Flow" emerged as a concept when Csikszentmihalyi set out to explore how and when boredom and anxiety overtake or impede meaningful encounters with any domain of

endeavor, or rather, when he set out to find out about the internal dynamics that are present when individuals are totally and joyfully involved in any human experience. Flow occurs when powerful concentration brings about such great absorption with the task or activity that one feels completely happy and free from mundane existence. While such a concept may seem at first thought to be somewhat foreign when describing a child, it takes little imagination to realize that youth too can experience "flow", such as in the example of AL. I think also of my adolescent son one day in our back yard obviously so intent that no one else existed at the moment while he was completely absorbed in the physical replay of perhaps the imagery of a complex gymnastics routine; or of a small child on the floor amidst blocks and toy vehicles oblivious to the presence of anyone else, playing out a fantasy of driving the fire engine having forgotten about friends calling him to the out of doors; or of a child at an easel brushing on paint stroke after stroke moving from one projected image to another and then to another while others around are engaged in loud play.

Thinking, feeling and willing. Building on the idea that thinking unfolds when feeling and will are combined, advocates of the Waldorf approach to education (see Hutchingson & Hutchingson, 1993) describe the preparation of Waldorf teachers who are taught techniques to ***combine these three functions--thinking, feeling, and willing--in every lesson***, every day, and even across a 13 year curriculum. Their curriculum is founded in the belief that when a child becomes excited, curious, or concerned about something, only then will his or her attention will be fully engaged. Thus, thinking, feeling, and the will to do something active with the material become natural coordinates in well designed curriculum in Waldorf schools, but as well, in well designed museum activities, adventures, and discovery activities.

These factors are similarly important to continued engagement and follow-through on school-based projects of adolescents (Delcourt, 1993) and the life work of creatively productive adults (Haensly & Roberts, 1983). Delcourt analyzed the school-based independent projects of 18 students from four different sites whose school program employed the Enrichment Triad Model (Renzulli, 1977). In the most successful investigations completed by these students, the students described five criteria: genuine interest, self-satisfaction and enjoyment, audience recognition and helpful feedback, and the fact that the project worked. Creatively productive adults reported similar ingredients were necessary, adding task commitment to the equation (Haensly & Roberts, 1983). It appears that, just as educators in the Waldorf schools found, whatever the setting, engagement begins with some kind of feeling experience, is continued through thinking about the experience and content, and is actualized through a willingness to remain engaged.

Co-learning between children and adults. Other schooling approaches focus on the co-learner role of adults, especially parents, in these activities. Barbour & Shaklee (1998), citing Gandini (1997), describe ***the role of parents*** in the Reggio Emilia approach to gifted child education as "***equal partner in the education of their children***. . . participate through

discussions. . . daily interactions. . special events, and celebrations." They further describe how ideas come forth and grow when children discuss, dialogue and debate; how the content for this growth is defined by the children's interests, and how teachers scaffold experiences in order to co-construct knowledge with the child. Barbour and Shaklee cite the pedagogical philosophy of Annemarie Roeper as she talks about how successful teaching of gifted children can only occur when we listen to the soul and mind, the child's passions, for they are the foundation of their learning experiences (Roeper, 1997). And finally, Barbour and Shaklee refer to the futuristic admonition of Passow (1987) that the learning experiences of gifted students must be about the business of nurturing concern, personal responsibility and commitment so that they will address directly threats to humanity's survival.

Katz (1994) suggests that there are six lessons to be learned from the Reggio Emilia municipal preprimary schools model, lessons that apply especially well to our own discussion of the museum and exploration approach. She states first that in the Reggio Emilia approach, when children and teachers ***together examine topics of interest to young children, with high expectations of young children's abilities to represent their thoughts, feeling, and observations***, these children will make excellent use of the graphic skills that they have at hand. Second, when they have experience using their drawings and paintings for further discussion and work, they will attend to it with great care. Third, early introduction to realistic representations of what they observe does not appear to inhibit their later use of representation in creative and imaginative ways. Fourth, this kind of children's work leads to rich teacher-child relationships, which in turn, fifth, conveys to children that their work is taken seriously, and sixth, builds closer family and community relationships than most other early childhood programs.

We might also again think of the partnership aspect implied in the stakeholder concept. Friedman & Master (1981) describe the school and the museum as a potential partnership. They present a model whereby young children could participate in activities at the museum as part of their school curriculum, and in the process create a product for an actual audience. Their model derived quite directly from the Renzulli Enrichment Triad model (1977) in which children did exploratory activities in phase I, learned the skills of inquiry and problem solving in phase II, and in phase III, engaged in independent projects evolving from the content that intrigued them in phase I, projects designed by them to be presented to a real audience upon completion. Based on these authors' experience with the Alpha Project, involving their school and a university museum gallery, Friedman and Master describe the hurdles that had to be overcome to make this partnership work---from scheduling to transportation to oversight staffing for off campus activity during the museum visits. They describe also the necessity for a successful museum school program to include teaching so that discovery and inquiry take place and children become active participants, while the adults must be planful, flexible, and courageous. For other practical assistance,

Gartenhaus (1991) offers an experience in museum literacy for teachers, providing detailed resources and ideas for teachers to incorporate and synthesize experiential learning.

While Barbour & Shaklee (1998) and Friedman & Master (1989) emphasize the application of museums to a different kind of curriculum in our schools and describe the educational programs that evolved, their ideas are just as relevant if not more so to the intellectual and personal growth of children outside of the school setting, in partnership with their parents and/or mentors. It will be useful to keep these ideas in mind as we discuss how museum, discovery, and exploration activities are a dynamic, sound, and vital way for parents and other caregiving adults to shape the child's learning environment outside of school, as well as in school! These experiences that link the child's everyday experiences with passionate interest in some aspect of the experiences, in which caring adults or other experts provide the scaffolding or indirect guidance to the child's exploration, will set the stage for lifelong learning geared always to the child's ability and proximal zone of growth (Vygotsky, 1978), ideally and intrinsically differentiated by the child's own self-direction and agency with regard to their own learning (Hertzog, 1998).

Focal relationships and crystallizing experiences. Such interactions and outcomes as described above, while normally occurring in many rich developmental sequences, may lead as well to unique events quite significant to the development of some though not all extraordinarily gifted individuals. Albert, in his book on genius and eminence, discusses focal relationships (Albert, 1992) and crystallizing experiences (Walters & Gardner, 1985) as possible outcomes of adventure and exploration experiences. Albert (1992) suggests that both, though different in context, foster in the early life of gifted individuals a "reality-based sense of identity and competence" (p.15). He describes crystallizing experiences as "unpredictable, intensely insightful episodes of self-discovery" (p.15), and states that not all gifted children have these experiences. Siegler and Kotovsky (1992) suggest that "some people's biological makeup predispose them to be interested in, and exceptionally skillful at, certain domains ***if they receive the right type of experience***" [emphasis added] (p.101). These authors also note that the effect of the crystallizing experience may be to "stimulate interest in some particular approach or area within the domain" (p.101), later serving to lead them to particular careers or passions. Crystallizing experiences, according to Walters and Gardner (1985) documenting such phenomena in geniuses through retrospective biographical studies, are fragile phenomena, occurring only when talent, exposure to particular materials, and self-teaching combine in quite propitious ways.

Avoiding the superficiality of one-shot visits. Unfortunately, the museum and adventure contexts have often attracted interactions which serve little long-lasting purpose for the child as a constructive learner. Howard Gardner, for example, describes "one-shot visits to museums" where it is possible for children to "fail to appreciate the meaning and implications of exhibitions encountered" (Gardner, 1991, p.203). For example, one wonders about the quality of

discovery and whether anything was happening art-wise, aesthetically, or intellectually for the 15 - 18 month old child in his stroller, observed proceeding through the Smithsonian Art Museum in his mother's tow as she periodically in each room of paintings came down to his physical level to show him the paintings in her book and to indicate their placement in the room--perhaps this was a visually gifted child amazingly receptive to the setting and the indicated connections. Indeed, the child seemed passively responsive to the time with his caregiver even though participation was not exactly evident, and, as Gardner points out "no one flunks such museum experiences." Much less confidence can be placed, however, in the speed races that become evident on some school field trips, which may be characterized as superficial surfing (Haensly, 1998a, 1998b). Avoiding this type of superficial interaction may be accomplished by attending to the contextual characteristics of well-designed museum and adventure programs, to be discussed in a later section of this paper.

Relationship to Differentiated Curriculum

Differentiated Curriculum Defined

According to Passow (1982) and the Curriculum Council convened by the National/State Leadership Training Institute on the Gifted/Talented in 1981, "differentiating curricula for the gifted/talented is essentially a process of individualizing curricula to better match individual and group learning needs, abilities and styles. . . Curriculum differentiation aims at eliciting learner responses commensurate with gifts or talents" (p.6). Many educators undoubtedly consider the term curriculum as a prerogative of schools and teachers, a somewhat formally planned ***schedule*** of content and process (see Passow, 1982, pp.7-10 for seven guiding principles to differentiation) that will be delivered through a variety of instructional approaches over the course of a specific time period in a school setting. In Tomlinson's case study of a midwestern school district (Tomlinson, 1995) regarding differentiation in their middle school's instruction and whether and to what extent it was taking place, she found that differentiation was understood differently by different people. This school district, in order to discuss their own process, needed to arrive at a consensus about a common definition. For them it has now come to mean "consistently using a variety of instructional approaches to modify content, process, and/or products in response to learning readiness and interest of academically diverse students" (p.80).

Differentiated Curriculum as An Agenda of Choices with Implicit Guidance

In this study we believed it justifiable as well to consider curriculum as an ***agenda,*** rather than a ***schedule***, a more open plan of possibilities for learning provided by a defined set of experiences but taking multiple shapes out of the variety of choices differentially made by individual participants with individual "learning rates, styles, interests, and abilities" (Passow, 1982, p.6). Hertzog (1998) describes open-ended activities as having the potential to differentiate the curriculum through learner responses, as opposed to offering different learning experiences to children because of their differing rates of learning, styles, interests and abilities. In her

examination of the nature of open-ended activities, Hertzog concluded that "differentiation occurred by students responding in more depth, with higher level skills, and in ways which were guided by their learning style preferences, and not from the teacher offering something different, more complex, or more abstract" (Hertzog, 1998, p.223).

We, in turn, have proposed that the set of experiences arising out of a plan of possible engagement by youth for whom the children's museums or adventure programs have been designed constitutes an ideally differentiated curriculum with naturally evolving possibilities for learning in an environment that itself embodies choice. If placed on a continuum of choice possibilities, one might find the formal curriculum of teachers in schools at one end of the continuum; Hertzog's described open-ended activities (1998) and project approaches such as those suggested by Katz (1989) and implemented by Liu and Chien in Taiwan (1998) within a variety of possible instructional approaches in the middle; and museum and adventure experiences in a variety of venues for learning but specifically characterized by choices the learner rather than the teacher makes, guided however by a variety of adults from parents to museum planners and apprentice masters, at the far end of the continuum.

Contextual Characteristics of Museum and Adventure Programs

We have probably all visited many museums and been aware of many planned adventure programs. Even the writings or pictographs on the walls of the Anasazi caves in southwestern U.S. represent a form of museum. More formal examples come to mind such as the Louvre, the Houston Museum of Natural Science, the Boeing Air and Flight Museum, or the Tokyo Museum of Fine Art. However, we would like to focus here on the contemporary museums that have featured participatory exhibits, ranging from what is simply called "hands on" materials to virtual reality experiences made possible by complex computer technology. Thus, we can partner our consideration of children's museums with the concept of adventure, exploration, and discovery forums. These latter settings share contextual characteristics that make them ideal for the constructivist learning we have envisioned as ideally motivating, facilitating a lifetime of learning begun in early childhood as the child begins to interact with materials from which to construct her knowledge base.

Internal Consistency and Reliability

We have used these terms originating in science and statistics in order to emphasize the scientific foundation of the undertakings we are describing in this paper. Reliability is typically held to be synonymous with "dependability, stability, consistency, predictability, accuracy" (Kerlinger, 1973, p. 422), prized especially as a precondition for validity, a construct that also ensures trustworthiness (Lincoln & Guba, 1985) for claims that an event or action has the power to result in a specific outcome or set of outcomes. These terms are applicable to our exploration of a curriculum with intrinsic power for differentiation, especially found in museums, adventures, and

discovery activities ***when*** the exhibits and activities are appropriately constructed, introduced, managed, guided and evaluated. In order to retain such internal consistency and reliability, there are essential criteria that must be observed or fulfilled, and critical attributes that must be present to bring about the desired outcomes, those described more loosely in the previous section under "functions served", and "nature of interactions".

Essential criteria. Four essential criteria must exist for these forums of museums and adventure programs to be dynamic and productive in a consistent way. The first criterion is that activities must be constructed with the idea that learning is an active process of change in which thinking complexly is of greater importance than learning about the domain itself. This does not mean that knowledge of the domain is of no concern. We know that a critical amount of domain knowledge must be present in order to think deeply about it. However, the intrinsic adaptability for learners at all levels of prior knowledge about the domain comes about when the domain content is so clearly evident and so clearly approachable that deep thinking can be applied; this requires the use of overarching or connecting themes, with an example to be found in the description of the Smithsonian Early Enrichment Center Program in the last section of this article. The degree of abstractness of a theme contributes to its versatility for extension to multiple contents, experiences, and contexts. Maker (1982), citing Bruner, Taba, Womack, describes this multilevel approach to curriculum as reflecting the concept of a spiral curriculum. The spiral curriculum assumes that the learner in successive encounters can keep returning to an expanded domain content, continuing to think complexly about it as the scope and depth of the content increases.

The second essential criterion is that the activity must be so arranged that learners can find ways to take charge of their own learning, becoming agents instead of pawns in the active processing of any of the ideas associated with the content of the activity. The foundation for self-directedness and responsibility for one's own learning is being laid in this process as well.

The third quite essential criterion is that wise guides must be available to provide scaffolding for the participant, ensuring that the activity takes the learner to new levels of knowledge and understanding. These wise guides may be any of those co-partners mentioned earlier, parent or teacher or mentor, or even a more advanced peer. Their task is to provide scaffolding for increasing the complexity of understanding, the nature of which will be discussed in a following section.

A fourth criterion, indirectly related to the first two, is that the activity must be perceived as "fun". This kind of fun becomes part of the motivational force that keeps the participant actively engaged in the activity because of increased levels of arousal and control brought about by the activity. Children who find cognitive task engagement enjoyable at an early age are more likely to continue to pursue such tasks and in the process enhance their own intellectual development, a

finding supported by the Fullerton Longitudinal Study of infancy through adolescence (Gottfried, A.W., 1984; Gottfried & Gottfried, 1994).

As a cautionary note, a number of activities might be considered as fun because they offer novelty and play exclusively peripheral to learning. However, in effectively productive museum and adventure activities, fun must be derived from aspects central to the learning to be activated, that is, it is the curiosity, challenge, and delight in the complexity of the activity that produces a perception of fun. Adolescents may equate the quality of a learning experience with its degree of fun, as reflected in this quote from one student's journal: "Mr. Findley taught us a lot but he was so weird and funny that we had a great time" (Haensly & Lehmann, 1998, p.17). A study of gifted students' conceptions of academic fun (Middleton, Littlefield, & Lehrer, 1992) found that students' conceptions of fun are remarkably similar across age and gender. These authors found some gender differences in the type of content that generated a perception of fun, also that some school activities decreased in perception of fun as they became more common or as students lost the sense of personal control over their own engagement in the activity when adults took on more direct management of the activity. These "fun" learning experiences can capture both children and adults, as e.g., when adults continue to pursue solution to a problem in math or puzzles or chess or other games because they perceive engagement in the activity as a personal experience of fun.

Critical attributes. Pressey (1955), discussing the nature and nurture of genius, states: "At any age, development of any ability is fostered by a favorable immediate environment, expert instruction, frequent and progressive opportunities for exercise of the ability, social facilitation and frequent success experiences" (p.125). Thus, when Eleanor Gibson (1982) describes the mutuality between an organism and its context as affordance and effectivity, she is reaffirming the concept of critical attributes embedded in Pressey's nurture of genius when he cites "favorable immediate environment " and "frequent success experiences" as the critical reciprocal interaction.

Both the environment and the organism must have potential in order for a successful outcome to occur. Affordance is the characteristic of any task or situation by which that task or situation specifically provides or offers the organism, in this case, the child, the means for an action to be taken. Effectivity is the potential of the organism, again the child, to act on the environment in an effective way in order to accomplish some goal. Rogoff (1990) describes this mutual or reciprocal relationship in this way: "The thinking organism is active in participating in any event, exploring a situation, directing attention, attempting solutions. The individual is not merely a receptacle. . . Thinking is an event in which the animal seeks information relevant to functioning effectively in the environment. . . " (p.31). Museum and adventure programs must be so constructed that they invite, promote, and facilitate optimal responses from the child; that is their affordance. The child must have the potential to respond to that setting successfully, effectively interacting with the setting in a goal-oriented fashion, denoting the effectivity of the setting.

Examples of these two concepts will be found in the specific museum activities or adventure programs described in the final section of this article.

Scaffolding and Zone of Proximal Development

Rogoff's apprenticeships in thinking. Scaffolding is a wonderfully strong visual descriptor of the special process by which parents, teachers and other care-giving adults provide children with a platform to boost their thinking to another level. Barbara Rogoff, in her book, "Apprenticeship in Thinking. Cognitive Development in Social Context" (1990) describes how we bridge the gap from what is currently known to a new level of thinking, by the words or cues we give to children as they attempt to think about a problem or new concept. We give this kind of guidance through carefully worded prompts, questions, and suggestions that allow the child to take the initiative in the next step of their thinking, but that "point them" in a productive direction. The goal is to nudge their thinking so that they can construct their own understanding, rather than simply repeating the thinking of others as might have been thought of in early behavioral or even Skinnerian theory. The most successful scaffolding occurs as the adult or wise guide, who may or may not have a greater fund of knowledge about the problem, but does know about thinking and problem solving, participates in the problem solving, modeling questions for which the guide too wants to know the answers, thus becoming participants in the learning process with the novice-child. The idea is to guide by suggestion of possibilities, rather than the telling of outcomes, so that intellectual growth and the excitement of engaged thinking occurs for both child and guide, but especially for the child.

As wisely stated by one teacher education student studying children's museum experiences, "Caregivers need to be aware that they are part of the interactive equation; parental involvement motivates and guides children, and avoids mistaking the museum for a daycare. . . Caregivers should know the difference between supporting their child's learning and explaining all of the mysteries away" (Burns, 1996).

Vygotsky and the zone of proximal development. The concept of scaffolding makes even more sense when we examine the concept of zone of proximal development. Vygotsky (1978) provided this latter concept in an attempt to convey the idea that for all learners there is a limited boundary beyond current competence when the learner can understand at a next level of complexity, but only if guidance (scaffolding) from a more knowledgeable individual or someone with greater expertise is given. Vygotsky was specifically focused on the sociocultural aspects of learning. Rogoff describes it especially well-- "the zone of proximal development is a dynamic region of sensitivity to learning the skills of culture, in which children develop through participation in problem-solving with more experienced members of the culture" (1990, p.14). Thus, thinking, cognitive development, competence, tools for thinking derived from one's culture are all embedded in a dynamic process which, in turn, alter both the individuals and the culture.

Adult/ Child and Expert / Novice Relationships

Mentors and apprenticeships. The concept of mentorship has become broadly used to describe many different degrees of a relationship developed whenever an individual with greater expertise works with one with lesser knowledge and expertise (Haensly & Parsons, 1993). Boston (1976) described the mentor as a conduit or channel for guidance and wisdom, moving out of the way of the growing competence of the youth and serving as a catalyst for growth in a direction best suited to the youth. Ideal mentorships in educational settings (Haensly, 1989) provide youth with an adult expert who gives guidance and encouragement because of a shared passion for an area of interest and inquiry, and in the relationship becomes a personal advocate for development of the individual's unique template, instead of a model for replication. In so doing, the mentor links the student with life outside of the school setting. While not an essential element of the museum and adventure program mode of learning proposed in this paper, mentors can extend the experience immeasurably if the child's interest that developed in the program's inquiry persists or expands and an expert is willing and available.

On the other hand, the apprenticeship model of learning or apprenticeship in thinking described above plays a critical support role during the activities in well-structured museum and adventure programs through pursuing the individual child's zone of proximal development and providing specific scaffolding. Apprenticeship can involve adult and child, or can involve a group of novices (peers) who serve as resources for one another in exploring a new domain, according to Rogoff (1990). Lave (1988) states that "apprentices learn to think, argue, act, and interact in increasingly knowledgeable ways with people who do something well, by doing it with them as legitimate, peripheral participants" (p.2).

Growth-oriented and/ or project-oriented. Inquiry by its nature leads to a growth-oriented experience. When museum experiences and adventure programs are characterized by the essential criteria and critical attributes just discussed, the accompanying inquiry facilitates development of both the cognitive and social being of the child. Such inquiry quite naturally evolves into projects even when the inquiry process is not formally presented as such. Educators have found that projects strongly support self-directed learning and development, in turn, promoting the skills needed for lifetime learning. Though holistic project-learning has been an important part of early childhood education throughout the 20th century, Katz and Chard (1989) brought new attention to its use in early childhood education. Science fair projects, history fairs, and other discipline-specific competitions have centered on projects as reflective of the world of work and careers.

Projects recently became more appealing to teachers as they observed the enthusiasm and receptiveness by children to this mode of learning, and they are at the heart of the Reggio Emilia approach to early childhood education (Gandini, 1997; Katz, 1994). Projects fit well the

developmentally appropriate practice that the National Association for the Education of Young Children (NAEYC) advocates (Bredekamp, 1987), with specific directions available for project planning strategies and viable examples available (Hartman, 1995). They are also an appealing and practical way to involve parents in the school-based curriculum, even in parts of the world where the roles of parents and teachers have been quite philosophically distinct and separate, such as in Chinese preschools. Though Chinese educators have not traditionally promoted parental participation in the classroom, educators in Taiwan found many benefits of parental involvement emerging when they initiated a project approach (Liu & Chien, 1998). The critical aspects of productive adult/ child educative experiences can thus be embedded in and experienced through museums and adventure programs.

Applications of the Museum/ Adventure Model for Meaningful Learning

How do we construct such deep processing contexts, for whom, and under what circumstances? Gopnick and Meltzhoff (1997) propose that young children develop theories about how their world works, they test how the information they're gathering and responses they make connect and move them towards a goal, they act on their conclusions, and then they theorize some more, and so forth, on and on. Explorers and inquirers they are, and certainly scientists in the best sense of the word as they gather data, set up a hypothesis, test it by acting out some response, and then move on to the next level. We propose that this constructive process or construction of the mind continues on through life for youth and adults, improved constantly by the acquisition of new skills and strategies through instruction and modeling by competent and expert teachers, peers, and mentors. Instances of well-conceived applications of the museum/adventure model can help us see additional possibilities, specifically structured for the youth with whom we work and for the environments which are available to us or which we can modify, gravitate to, or reconstruct for our particular population and specific domain of knowledge and learning.

The Smithsonian Early Enrichment Center

The Smithsonian Early Enrichment Center, or SEEC, is a program that has evolved from an on-site day care for staff children at the Smithsonian facilities to a model preschool designed for children from 3 months of age to 6 years, with the goal of promoting exploration and adventure in an exhibit-rich museum context (Heyman, 1998). Its director, Sharon Shaffer has created a national model for museum-based education for young children, developing a curriculum called "Museum Magic". The curriculum for the program connects children's exposure to exhibition objects with unique activities across a variety of disciplines to be experienced in the art galleries, gardens and National Zoological Park. Using a unifying theme to give connection to the experiences, children are guided through a series of different domains and contexts for learning about the theme.

The example provided by Heyman refers to a theme of communication in which children might examine symbols from the Museum of African Art and then back in their classrooms create symbols of their own, using art forms such as sponges and printmaking materials. Next, a visit to ballet sculptures by Degas, prefaced by a discussion of dance as a means of communication, might lead to opportunities for the children to dance and pose as in the sculptures, and then listening to different kinds of music, imagining and trying out dancers' movements. This might be followed by a visit to see lighthouses in the American History maritime exhibit, where various ideas about how light and rhythm sticks can be used to communicate important messages. A culmination of this thematic exploration might involve viewing a Georges Seurat painting of a lighthouse to see how the artist communicated different qualities of light, again with activities to try out their own artwork for communication.

As you can see, children of multiple ages and types and levels of ability could enter more deeply into the activities that interest them most at different points along the sequence of exploring one overarching theme, the theme connecting or opening doors to a wealth of other explorations and disciplines in other settings and at other times. The possibilities at each segment of the described sequence are themselves unlimited. Personal choice of content and learning mode, pace or length of time for exploring any one of the activities, depth of exploration are all variables controlled in great part by the children themselves. Two critical aspects of this program contribute to its versatility in becoming a differentiated curriculum, rather than just another collection of interesting exhibits. The first is that some expert in the field of museum construction and in the field of pedagogy has set forth a plan of action by which to suggest a unified thread between very diverse exhibits that might be explored and lead to deeper understanding of the phenomenon represented by that unifying thread, in this example, the theme of communication. The second critical aspect is the sensitivity of staff to scaffolding for the individual children, through suggestions, prompts about innovative ways in which each exhibit might be explored, and the open-ended nature of each of the activity segments while retaining the connections between them. Thus, throughout a month or longer segment of time the varied exhibits become an avenue to both wide-based yet insightfully deep conceptual knowledge, while providing a differentiated curriculum for many preschoolers who have multiple interests, abilities, cognitive styles of knowledge acquisition and processing, and prior knowledge bases.

Whatcom County Children's Museum

Many large cities have begun to develop Children's Museums that have sufficient resources to construct a variety of exhibits from which innovative parents or teachers can construct a unified set of activities with possibilities for differentiated curriculum for multiple children on the order of what has just been described for the SEEC. However, not all of these museums consider arranging

for the unifying and educational aspect as much as how to create a playful and intriguing entertainment experience.

Nevertheless, on a much smaller scale than the Smithsonian, the children's museums that are emerging all over the country provide opportunities for young children to explore materials and exhibits in an active way, connecting with different contents and processes in a playful mode that promotes enjoyment while nurturing intellectual growth. The key to whether the exhibits and activities in these museums stimulate meaningful and long lasting learning lies in at least three major areas: (a) the extent of creative and thoughtful planning by directors of these museums; (b) the nature of scaffolding facilitated by the museum staff to both children and parents; and (c) the readiness of users--children and parents--to take the time for extended processing rather than an afternoon of busy "taste testing". Types of scaffolding often need to be suggested to parents, modeled by instructions that accompany the exhibits, and physically generated by the exhibits themselves. Such "scaffolding" for parents may be found in a brief guide for family visits to museums, available in the public domain; the guide focuses on optimizing learning, suggesting ways to prepare for a museum visit, ways to help children interact with exhibits, and how to extend the experience after the visit (Greene, Magarity, & Toth, 1998).

The Whatcom Children's Museum is located in the downtown area of a midsize city in a northwestern state, population about 60,000. This museum is contained in one large room with a small room in the back set up for craft and group activities and housed in a brightly painted one floor building, and containing a rich collection of a wide variety of interactive exhibits. These exhibits are arranged in stations and planned to fit a theme which changes about every three months, with major changes in the exhibits about every six months. During a period for the theme of "Busytown", children could simulate being an adult member of a town (Kittelson, 1997) which included such things as a post office and a fire engine that could accommodate several children at a time; a stage setup with available costumes and ticket sales materials called the storybook theatre; a puppet theatre with a variety of puppets that the children might use to put on a show; a human skeleton alongside a simulated human body as in a hospital, in which soft material-constructed organs can be removed and replaced; a magnet station at which a table with a drawing of a city and streets and magnetic cars and boats placed on the table which could be manipulated by placing a string-held magnet underneath the table; and another station at which two computers were set up with programs on it relating to the museum's current theme. As you can see, these exhibits which change regularly to fit some kind of general theme for the museum can be experienced as separate activities which give children many choices upon which to remain focused for some time, or can offer a smorgasbord of manipulative experiences for each visit and each visitor.

A study of the nature and effect of one such museum was conducted by teacher education students engaged in an advanced cognitive development course which I taught at a major

university. Their findings are of particular relevance to this paper. Through their prolonged observations of children and accompanying adults at the museum, the preservice teacher-researchers extracted numerous examples and rich insights regarding museum-generated cognitive development. The first insight has to do with the central intent of the museum planners and director. As reported, the director who had worked at the museum for 10 years said that the museum provides many open-ended activities to generate a variety of responses, in which "almost every way is the right way. . . helping children feel successful as they explore and expand their world. . give children freedom to move and to choose. . . encourage children to decide for themselves how they want to participate and for how long. . giving the children a chance to participate several times. . . [all of which] lays the groundwork for feelings of confidence and competency in creating, exploring, and learning. . in turn helps promote learning and self-esteem by creating a "yes" environment " (Erickson, 1997, p.3).

The second aspect has to do with the assistance given to the adults who come with the children. Another director informed the teacher education-researchers "that the museum's intention was to foster imagination in the children as they participated in activities" (Kittleson, 1997, p.4). The museum director stated also that she believed in the positive effects of adult interaction, which they try to encourage in whatever ways possible, including a pamphlet listing some questions to ask children as they participated in the various activities. "During my visits I noticed that a lot of the time the parent(s) told their child how things work without questioning the child first." (Erickson, 1997, p.3). However, this observer also found many other positive examples of effective scaffolding. For example, one mother and her 8-year-old daughter were discussing how a pulley exhibit worked; she asked "Why do you think it does that?" After further questioning with the girl trying to figure out this physics puzzle, "she told her mom that the strings were pulling the pulley and making it move up and down" which required some additional explanations and questions from the mother, though gave only limited scaffolding to another level of complexity in the child's thinking. Another observer (Kittleson, 1997) had this experience: One little boy appeared to be quite interested in why he could lift so much weight with the pulley. When he asked his dad, his dad turned the question back to him. When the boy still couldn't seem to explain, his father kept the explanation simple by stating that when you pick up something by pulling it with a rope or wire over something else, it becomes easier to lift because the weight is distributed and the 'something else' helps lifts the weight. With this in mind, "the boy then stated that he could maybe get some heavy wood up into his treehouse that way" and his dad agreed that they could test out this idea.

We interject here an important understanding of the events just described. Applying new information to already familiar experiences and finding ways to extend an understanding of a concept by applying it in a new way are important steps in moving a learner from the pseudo-

concepts created with simple attribute listing (often employed in concept teaching and abhorred by physics experts) (Davydov, 1990) to real conceptual understanding, an amalgamation of Piaget's and Vygotsky's positions on concepts, cognition, social activity, and epistemology! Davydov states "Productive activity that concerns practical objects--labor--is the basis of all human cognition" (p.233).

The third aspect has to with the readiness of children for a museum experience. "There were some children who walked in, their parents waited at the door, they [the children] quickly went through everything in the room and then they left. Then there were children whose parents brought them in, went through every activity/task with them, asked them questions, and then encouraged them to explore and answer the questions. Some of these children stayed in the museum for hours" (Kittelson, 1997, p.4). The examples listed above illustrate well the latter condition. Each of the teacher researchers observed this distinction in various ways, commenting on their own early disbelief that such differences could occur between effective scaffolding by adults, and reporting a new understanding of what scaffolding must involve. As one reported (Wilcox, 1997), citing our primary text, "According to Rogoff, the affordance and effectivity of the museum will help the individual transform itself to better fit its niche (Rogoff, 1990, p.31). The museum is providing children the opportunities to better understand concepts that they will encounter throughout their lives, thus, helping children to understand their environment" (Wilcox, 1997, p.7).

Mr. Rick's Third Grade History of Civilization

There are other situations in which the museum concept can be applied, and other ages for whom it can be appropriate. One of these, described in greater detail elsewhere (Haensly, 1998) is Mr. Rick's history of civilization, Southwood Valley 3rd grade 301, which begins in September with the Stone Age and is completed by the end of the school year, approximately nine months later. The history of civilization is divided into six time periods, each characterized by major approaches of humans to living based on the extent of their technology and the demands of their environment. He frees up his classroom space and time so that his students can reconstruct a particular age of history, engaging in investigation and a reconstruction of the artifacts and activities of humans in that time period. The inquiry encompasses investigative skills, including how and sources to search for information, weekly spelling lists (laden with student-generated, multi-syllabled terms related to their investigations as well as more mundane words), reading and literature, mathematics and science as they solve how to reconstruct architecture and other artifacts, and all the aspects of a third grade curriculum with state mandated essential elements.

Encyclopedic volumes and other books of information are stacked on desk tops, materials for the museum emerge in corners, and children are seen conferring in small groups with each other, or dialoguing with Mr. Rick about the era and how best to proceed. Choices are made by

individual students regarding investigative style, what to include, and partners for various aspects of the inquiry. Decision-making and analysis and evaluation skills are called upon for both the process and about events that occurred in different eras--e.g., in what ways did this war lead to scientific advances, or to peace? Each six weeks of inquiry is culminated by a museum exhibition to which other classes, teachers, parents and community come for a viewing. Students move on to the next grade level well-versed in advanced investigative skills, thoughtful conceptualization processes, and creative ideas, as well as being known for carrying on philosophical discussions in such arenas of their living as the Little League baseball bleachers as to why Shakespearean characters were portrayed in certain ways.

It should be noted here that Mr. Rick does not believe his curriculum is specifically for gifted youth and is adamant that every child can participate in this "history of civilization" museum curriculum at the varying ability levels they have developed in becoming third graders. It qualifies as a differentiated curriculum because it serves all of the functions described earlier, from emotional enjoyment and interest to interdisciplinary connecting and learning for a lifetime. Vygotsky's concept of zone of proximal development becomes a major guidepost as Mr. Rick makes decisions about what kind of help and how much ***each student*** needs to keep moving forward and actively involved, his scaffolding. Choice, interest, and involvement are all present, as is a differentiated curriculum.

Adventures for Adolescent Learners

Many programs for adolescent learners have arisen in recent years based on the idea that adventure is a context to which adolescents can be drawn, and that the context can be as varied in its discipline content as medicine, marine biology, architecture, water hydrology and environmental stream conservation, theater, or archaeology . Universities across the nation are finding that such programs add an important dimension to their annual programs, moneywise and facultywise, utilizing resources that might otherwise lie fallow for the summer months. Some of these programs began because some university educators believed that adolescents might be "tricked" into becoming deep learners in a vacation-like setting exploring in depth a particular area of interest in ways seldom encountered in their school classrooms. Thus, the Galveston Island Adventure program established by Dr. Bill Nash out of Texas A&M University, served hundreds of adolescents from around the nation in settings connected to the nearby astronaut program at NASA, the university laboratory hospitals, the rich architectural heritage of the city of Galveston, or the marine biology life of the Gulf of Mexico.

In a different approach, in a NASA-funded program, 50 American Indian students from several northwestern Indian Nations entering tenth through twelfth grades are involved in the Seaquest Program. They focus on geology, environmental science, and aquaculture, doing both classroom studies and spending afternoons at science activities in the field. Students are

encouraged to set up projects themselves; one example included doing an inventory of coho salmon at the tribal fish hatchery. Fun, hard work in the out of doors, learning academic skills, and cultural relevance are all characteristics of this program, along with extra high school credits and career paths explored.

Characteristics of the more effective programs include "fun" high on the list of adjectives applied by participants, specific interests explored in unusual ways, learners being led by "turned on" faculty experts who relished the opportunity to work with adolescents who responded in much more exciting ways than many of their undergraduate students, and the challenge of learning concepts and strategies deemed important by the experts in the field. Such challenge came from tapping zones of proximal development in bright students who had often been only marginally aroused by the expectations for academic response current in their regular classrooms. Activities and guidance were planned and delivered on the assumption that this was as much fun for the teachers as for the students. We might say that affordance and effectivity were rampant.

Though mentorships or the idea of internship is not always explicit in such programs, faculty implicitly became mentors to many of the students, sometimes through one summer's experience alone, but often as the students returned for the next summer or kept in touch after the program ended. Sometimes the mentoring occurs between a staff member and the youth, and often much of the mentoring has to do with living a life, learning about learning, or other life activities.

It must be acknowledged that not every youth experiences every program as the adventure that would change their life; programs too must be differentiated. Having experienced one segment of exploring architecture, or experiencing how astronauts live and work and at what they must be outstandingly knowledgeable, does not lead every youth (nor even the majority of them) to that discipline as a career. In fact, such experiences often serve a quite useful purpose of early recognition that what looked like a superb career possibility really isn't the one to whom that individual is most fitted; the reality of work in that field, not apparent before the experience, may be a significant outcome of many adventure programs. Participants in Camp Planet Earth, a geosciences adventure program for minority adolescents (Haensly & Lehmann, 1998), did not all intend to become the scientists related to this discipline or even aspire to any of the engineering specializations of the sponsoring university. Career aspiration for fine arts careers, teaching, or business sometimes was reconfirmed by the adventure experience, even though participants reported having learned much about themselves and about learning itself through their experience in the program.

Conclusions

The purpose of this paper has been to present the rationale for how museums, adventures, and discovery activities can become intrinsically differentiated curriculum. To do this, we presented ideas about what functions these forums serve, who are the stakeholders, and what is the

nature of the interactions and content in these forums. Not all museum and adventure programs necessarily fulfill the goals of a curriculum, that is, a connected experience to promote knowledge (epistemology) about a content through content-specific and general knowledge acquisition and synthesis processes. We needed, therefore, not only to delineate the contextual characteristics of effective museum and adventure programs and to explain their critical attributes, but also to establish their linkage with differentiated curriculum as a concept. Among these attributes are included the ideas of how to provide appropriate scaffolding in order to differentially access the differing zones of proximal development of individuals, the points where learning and knowledge will advance in complexity and breadth. Finally, we described examples of both authentic museum and adventure programs that fit these attributes as well as an example of how this approach might be accomplished in a school classroom.

Stephanie Pace Marshall, the founding executive director of the Illinois Mathematics and Science Academy, suggests that the reason why museums and apprenticeships are so powerful for learning is because "they facilitate learning that is both authentic and explicit" (Marshall, 1994, p.192). In Howard Gardner's words, they create environments which enable students to "naturally link their intuitive ways of knowing with scholastic and disciplinary forms of knowing", building the capacity of learners to "take risks for understanding" (Gardner, 1991, p.258). Marshall adds, "schools as museums, teachers as master craftsmen, and students as apprentice investigators--these are the educational environmental constructs in the high-stakes learning environment that we must create for our gifted students" (1994, p.192). In the meantime, until school environments universally become such enviable learning environments, parents and other educators may take hope in the idea that an ideal learning environment can be anywhere learning is occurring as an exciting, meaningful way of life, and that such environments can be made available in places other than school. We need only to become aware of them, prepare to use them effectively, and enjoy them whether we are children or co-learning adults!

References

Albert, R.S. (1992). Genius and eminence. 2nd edition. Oxford: Pergamon Press.

Bettelheim, B. (January/ February 1980). Children, curiosity and museums. Children Today.

Barbour, N.E., & Shaklee, B.D. (1998). Gifted education meets Reggio Emilia: Visions for curriculum in gifted education for young children. Gifted Child Quarterly, 42 (4), 228-237.

Bloom, B. S. (1985). Developing talent in young people. New York: Ballantine Books.

Boston, B.O. (1976). The sorcerer's apprentice: A case study in the role of the mentor. Reston, VA: The Council for Exceptional Children.

Burns, S. (1996). Major inquiry project report on children's cognitive development through participation in children's museums. Unpublished manuscript. Psychology special topics: Advanced cognitive development. Department of Psychology, Western Washington University, Bellingham Wa.

Bredekamp, S. (1987). Developmentally appropriate practices in early childhood programs serving children from birth through age 8. Washington, DC: National Association for the Education of Young Children.

Csikszentmihalyi, M. (1975). Beyond boredom and anxiety. San Francisco: Jossey-Bass.

Csikszentmihalyi, M. (1991). Flow: The psychology of optimal experience. New York: Harper Perennial.

Davydov, V.V. (1990). Soviet studies in mathematics education: Volume 2. Types of generalization in instruction. (Volume edited by Jeremy Kilpatrick; translated by Joan Teller). Reston, VA: National Council of Teachers of Mathematics.

Delcourt, M.A.B. (1993). Creative productivity among secondary school students: Combining energy, interest, and imagination. Gifted Child Quarterly, 37 (1), 23-31.

Erickson, K. (1997). Major inquiry project report on children's cognitive development through participation in children's museums. Unpublished manuscript. Psychology special topics: Advanced cognitive development. Department of Psychology, Western Washington University, Bellingham Wa.

Friedman, J.M., & Master, D. (1981). School and museum: A partnership for learning. Gifted Child Quarterly, 25 (1), 43-48.

Gandini,L. (1997). The foundations of the Reggio Emilia approach. In J. Hendrick (Ed.), First steps toward the Reggio way (pp.14-25). Columbus, OH: Merrill.

Gardner, H. (1991). The unschooled mind: How children think and how schools should teach. New York: Basic Books.

Gartenhaus, A.R. (1991). Minds in motion: Using museums to expand creative thinking. Davis, CA: Caddo Gap.

Gibson, E.J. (1994). Has psychology a future? Psychological Science, 5 (2), 69-75.

Gopnik, A., & Meltzoff, A.N. (1997). Words, thoughts, and theories. Cambridge, MA: The MIT Press.

Gottfried, A. (1984). Home environment and early cognitive development: Longitudinal research. New York: Academic Press.

Gottfried, A.E., & Gottfried, A.W. (1994). Continuity of intrinsic motivation from infancy through early adolescence. Paper presented at the meeting of the American Psychological Association, Los Angeles.

Greene, W.P., Magarity, D., & Toth, R. (1998). Museums & learning. A guide for family visits. Washington, D.C. : U.S. Department of Education, Office of Educational Research and Improvement. Also at http://www.ed.gov

Haensly, Patricia A. (November 14, 1998a). Museums, adventures, discovery activities: Meaningful processing or surfing? Paper presented and audiotaped at the 45th Annual Convention of the National Association for Gifted Children, Louisville, KY.

Haensly, Patricia A. (1998b). Parenting the Gifted. Children's Museums: Meaningful processing or superficial surfing? Gifted Child Today, 21 (3), 42-44.

Haensly, Patricia A. (1989). Mentoring in the educational setting: A pedagogical quintessence. Mentoring International Premier Issue, 3 (2) 25-33.

Haensly, P.A., & Lee, Kyung Sook. (August, 1995). Early expressions of giftedness in culturally diverse preschoolers. Paper presented at the 11th World Conference on Gifted and Talented Children. Hong Kong.

Haensly, P.A., & Lee, Kyung Sook. (in press, 2000). Gifted potential in young children from diverse backgrounds: What does it look like? Gifted Educational International, 14 (2), .

Haensly, P.A., & Lehmann, P. (1998). Nurturing giftedness while minority adolescents juggle change spheres. The Journal of Secondary Gifted Education, IX (4), 163-178.

Haensly, P.A., & Parsons, J.L. (1993). Creative, intellectual, and psychosocial development through mentorship: Relationships and stages. Youth and Society, 25 (2), 202-221.

Haensly, P.A., & Roberts, N.M. (1983). The professional productive process and its implications for gifted studies. Gifted Child Quarterly, 27, 9-12.

Hartman, J.A. (1995). Project work: Supporting children's need for inquiry. Focus on Early Childhood, 7 (3), 1-3. Association for Childhood Education International, Early Childhood Division Newsletter.

Hertzog, N.B. (1998). Open-ended activities: Differentiation through learner responses. Gifted Child Quarterly, 42 (4), 212-227.

Heyman, Michael. (November, 1998). Engaging a child's mind. Smithsonian, 29 (8), 12.

Hutchingson, R., & Hutchingson, J. (1993). Waldorf education as a program for gifted students. Journal for the Education of the Gifted, 16 (4), 400-419.

Katz, L.G., & Chard, S.C. (1989). Engaging children's minds: The project approach. Norwood, NJ: Ablex.

Katz, L.G. (1994). What can we learn from Reggio Emilia? In (C.Edwards, L.Gandinil, & G. Forman, eds.) The Hundred Languages of Children, pp.19-37. Norwood, NJ: Ablex Publishing Co.

Kerlinger, F.N. (1973). Foundations of behavioral research (2nd ed.). New York: Holt, Rinehart & Winston.

Kittelson, S. (1997). Major inquiry project report on children's cognitive development through participation in children's museums. Unpublished manuscript. Psychology special topics: Advanced cognitive development. Department of Psychology, Western Washington University, Bellingham Wa.

Lave, J. (1988, May). The culture of acquisition and the practice of understanding (Report No. IRL 88-0007). Palo Alto, CA: Institute for Research on Learning.

Lincoln, Y.S., & Guba, E.G. (1985). Naturalistic Inquiry. Newbury Park, CA: SAGE Publications.

Liu, K.C.Y., & Chien, C. (1998). Project approach and parent involvement in Taiwan. Childhood Education, 74 (4), 213-219.

Maker, J. (1982). Curriculum development for the gifted. Rockville, MA: Aspen Systems Publication.

Marshall, S.P. (1994). Our gifted children: Are they asking too much?" Gifted Child Quarterly, 38 (4), 187-192. (Keynote address, National Association for Gifted Children, November 6, 1993.)

Middleton, J.A., Littlefield, J., & Lehrer, R. (1992). Gifted students' conceptions of academic fun: An examination of a critical construct for gifted education. Gifted Child Quarterly, 36 (1), 38-44.

Passow, H.A. (1982). Differentiated curricula for the gifted/talented. Ventura, CA: Ventura County Superintendent of Schools Office.

Passow, A.H. (1987). Curriculum for the gifted. Gifted Child Today, 10, 15-16.

Pressey, S.L. (1955). Concerning the nature and nurture of genius. Scientific Monthly, 81, 123-129.

Renzulli, J. (1977). Enrichment triad model. Weathersfield, CT: Creative Learning Press.

Renzulli, J. (November, 1978). What makes giftedness? Reexamining a definition. Phi Delta Kappan, 313-319.

Roeper, A. (1997). Listen to the gifted child. Roeper Review, 19 (3), 166-167.

Rogoff, B. (1990). Apprenticeship in thinking. Cognitive development in social context. New York: Oxford University Press.

Siegler, R.S., & Kotovsky, K. (1986). Two levels of giftedness: Shall ever the twain meet? In R.S. Albert (ed.), Genius and eminence, pp. 95-108.

Tomlinson, C.A. (1995). Deciding to differentiate instruction in middle school: One school's journey. Gifted Child Quarterly, 39 (2), 77-87.

Vygotsky, L.S. (1978). Mind in society: The development of higher psychological processes. Edited by M. Cole, V.John-Steiner, S. Scribner & E.Souberman. Cambridge, MA: Harvard University Press.

Walters, J., & Gardner, H. (1992). The crystallizing experience: Discovering an intellectual gift. In R.S. Albert (Ed.), Genius and eminence, pp.129-155. Reprinted from Conceptions of Giftedness (R.J.Sternberg & J.Davidson, Eds., 1986).

Wilcox, D. (1997). Whatcom Children's Museum. Major inquiry project report on children's cognitive development through participation in children's museums. Unpublished manuscript. Psychology special topics: Advanced cognitive development. Department of Psychology, Western Washington University, Bellingham Wa.